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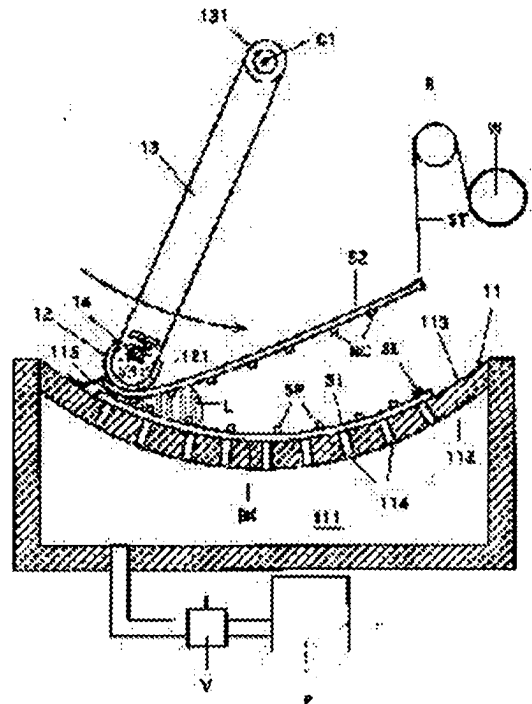
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(54) METHOD AND DEVICE FOR MANUFACTURING LIQUID CRYSTAL DISPLAY
CURVED SURFACE PANEL

(57)Abstract:

PROBLEM TO BE SOLVED: To easily manufacture a liquid crystal display curved surface panel so that a prescribed curved surface state can stable be maintained over a long- term while suppressing intrusion of the air bubble in a liquid crystal material layer, of/and while suppressing waste of the liquid crystal material.

SOLUTION: A seal wall material SL is disposed on at least either of a substrate S1 and a substrate S2. One substrate S1 is held on a stage 11 which has a substrate holding curved surface 113 with curvature according to bend of the targeted liquid crystal display curved surface pane. A state where liquid crystal material L is disposed between both of the substrates while being held in the state where the end of the substrate S2 is superposed on the end of the substrate S1 is formed. Both of the substrates are stuck together by extending the liquid crystal material L between both of the substrates by performing relative circular arc movement of a pressurizing member 12 and the stage 11 around a curvature



radius center C1 of the substrate holding curved surface 113 of the stage 11 while clamping both of the substrates by the stage 11 and the pressurizing member 12.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of the liquid crystal display curved-surface panel by which the image display side was formed in the curved surface, and its manufacturing installation.

[0002]

[Description of the Prior Art] A liquid crystal display panel has that common by which the liquid crystal ingredient is enclosed between the substrates of a pair.

[0003] By this type of liquid crystal display panel, a liquid crystal ingredient is surrounded with the seal wall which usually carries out the seal of the periphery section of the substrate of a pair, and is enclosed with that inside.

[0004] Between the substrates of a pair, the spacer for maintaining the gap between substrates to homogeneity at a predetermined thing may be distributed. The structure still like a resin column may be arranged between substrates. Or the structure like this resin column maintains the gap between substrates to a predetermined thing, it is made to serve also as the duty of adhesives further, and it is prepared for raising association of the substrate of a pair, as a result the reinforcement of a liquid crystal display panel etc.

[0005] For example beforehand, further, while formed the resin structure in the pitch and this liquid crystal display panel is formed through the process which sticks a predetermined geometry, or a substrate and the substrate of another side with which the seal wallplate has been arranged while the spacer was distributed beforehand. A liquid crystal ingredient is poured in by the vacuum pouring-in method etc., after being enclosed instantaneous or sticking both substrates, when sticking both substrates.

[0006] Moreover, in, carrying out the laminating of the liquid crystal display panel of the laminating mold which carries out image display using two or more colors, for example, the liquid crystal display panel for a red display, the liquid crystal display panel for a green display, and the liquid crystal display panel for a blue display for example, and manufacturing the laminating mold liquid crystal display panel in which full color image display is possible, the liquid crystal display panel of each color specification is formed, and it is manufactured by carrying out the adhesion laminating of these panels etc.

[0007]

[Problem(s) to be Solved by the Invention] however, the liquid crystal display panel of a monolayer -- be -- a laminating mold liquid crystal display panel -- be -- these display panels, although what has a flat image display side has so far been proposed Recently, in order to attach a display panel in the wall surface of a curved surface, the image display side is searched for for the liquid crystal display curved-surface panel of a curved surface by the reasons for the increment in the image display area in the limited field etc. for abundance-izing of a design for the request which comes from devices, such as a portable telephone furnished with a display panel.

[0008] Then, this invention makes it a technical problem to offer the manufacture approach of a liquid

crystal display curved-surface panel that a liquid crystal display curved-surface panel can be obtained easily.

[0009] Moreover, this invention makes it a technical problem to offer the manufacture approach of a liquid crystal display curved-surface panel that a liquid crystal display curved-surface panel can be obtained, controlling mixing of the air bubbles to a liquid crystal ingredient layer.

[0010] Moreover, this invention makes it a technical problem to offer the manufacture approach of a liquid crystal display curved-surface panel that a liquid crystal display curved-surface panel can be obtained, controlling the futility of a liquid crystal ingredient.

[0011] Moreover, this invention makes it a technical problem to offer the manufacture approach of a liquid crystal display curved-surface panel that the liquid crystal display curved-surface panel which can maintain a predetermined curved-surface condition stably over a long period of time can be obtained.

[0012] Moreover, this invention makes it a technical problem to offer the manufacture approach of the liquid crystal display curved-surface panel of a laminating mold that the liquid crystal display curved-surface panel of a laminating mold can be easily obtained from the liquid crystal display panel of two or more monolayers.

[0013] Moreover, this invention makes it a technical problem to offer the manufacture approach of the liquid crystal display curved-surface panel of a laminating mold that a predetermined curved-surface condition is stably maintainable over a long period of time.

[0014] Moreover, this invention makes it a technical problem to offer the manufacturing installation which can manufacture a liquid crystal display curved-surface panel easily.

[0015]

[Means for Solving the Problem] The manufacture approach of the liquid crystal display curved-surface panel which forms this liquid crystal display panel in a curved-surface panel in the phase which divides this invention roughly as the manufacture approach of a liquid crystal display curved-surface panel, and forms the liquid crystal display panel of (1) monolayer, (2) The manufacture approach of a liquid crystal display curved-surface panel of forming this monolayer liquid crystal display panel in a curved-surface panel in the phase which carries out the laminating of the liquid crystal display panel of two or more monolayers, and obtaining the liquid crystal display curved-surface panel of a laminating mold, (3) The manufacture approach of the liquid crystal display curved-surface panel which forms this liquid crystal display panel in a curved-surface panel in the phase which fixes the liquid crystal display panel of a monolayer to a liquid crystal display panel attachment component is offered.

(1) The manufacture approach of the liquid crystal display curved-surface panel which forms this liquid crystal display panel in a curved-surface panel in the phase which forms the liquid crystal display panel of a monolayer (the manufacture approach of the 1st type)

This invention offers the approach of of the following (1-1), (1-2), and (1-3) as this type of an approach. Easily, each approach explained below can control cellular mixing to a liquid crystal ingredient layer, and can obtain a liquid crystal display curved-surface panel.

(1-1) A liquid crystal ingredient layer is arranged between the 1st [which has flexibility in itself], and 2nd substrates. The process which this liquid crystal ingredient layer is the manufacture approach of the liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall which closes this periphery section between substrates, and arranges a seal wallplate at least to one side among the 1st substrate and the 2nd substrate, The process made to hold on this substrate maintenance curved surface of the stage which has the substrate maintenance curved surface of the curvature according to the deflection of the liquid crystal display curved-surface panel which is going to obtain one substrate among the 1st substrate and the 2nd substrate, The process which while was held on the substrate maintenance curved surface of said stage, and forms the condition that the liquid crystal ingredient has been arranged, among these both substrates while the predetermined edge of the substrate of another side is held at the predetermined edge of a substrate at a superposition condition, This pressurization member and a stage are centered on the radius-of-curvature core of said substrate maintenance curved surface of this stage, fastening both the substrates that predetermined edges piled up on said stage between the pressurization members and these stages which counter this stage. The

manufacture approach of a liquid crystal display curved-surface panel including the substrate lamination process which sticks both substrates from said superposition edge side, extending a liquid crystal ingredient among both substrates by carrying out radii migration relatively.

[0016] A concave bend side or a convex surface is sufficient as the substrate maintenance curved surface of said stage.

[0017] Moreover, at a substrate lamination process, a stage is arranged in an orientation, for example, a pressurization member may be moved, a pressurization member may be arranged in an orientation, and a stage may be moved.

(1-1-1) For example, the substrate maintenance curved surface of said stage is made into a concave bend side, and you may make it arrange this stage in an orientation (turning the concave bend side upwards, for example), and stick both substrates at said substrate lamination process, extending a liquid crystal ingredient among both substrates by moving said pressurization member in accordance with the radii orbit centering on the radius-of-curvature core of the substrate maintenance concave bend side of this stage.

(1-1-2) Moreover, the substrate maintenance curved surface of said stage is made into a concave bend side, and you may make it arrange said pressurization member in an orientation, and stick both substrates at said substrate lamination process, extending a liquid crystal ingredient among both substrates by moving this stage in accordance with the radii orbit centering on the radius-of-curvature core of the substrate maintenance concave bend side.

[0018] In this case, said pressurization member is arranged in the lowest orientation on the circle which passes along this pressurization member centering on the radius-of-curvature core of the substrate maintenance concave bend side of said stage, that substrate maintenance concave bend side may be turned upwards, and a stage may be moved in accordance with said radii orbit. If it does in this way, when sticking both substrates, extending a liquid crystal ingredient, the substrate handle part pan corresponding to the pressurization member which is in a low location most can be made to be able to leak intensively the liquid crystal ingredient which may be leaked out of a seal wallplate from a substrate lamination trailer, and a container etc. can recover easily.

(1-1-3) Moreover, the substrate maintenance curved surface of said stage is made into a convex surface, and you may make it stick both substrates at said substrate lamination process, extending a liquid crystal ingredient among both substrates by arranging this stage in an orientation (turning the convex surface upwards, for example, or turning downward), and moving said pressurization member in accordance with the radii orbit centering on the radius-of-curvature core of the substrate maintenance convex surface of this stage.

(1-1-4) Moreover, the substrate maintenance curved surface of said stage is made into a convex surface, and you may make it arrange said pressurization member in an orientation, and stick both substrates at said substrate lamination process, extending a liquid crystal ingredient among both substrates by moving this stage in accordance with the radii orbit centering on the radius-of-curvature core of the (turning the convex surface upwards, for example, or turning downward) substrate maintenance convex surface.

(1-1-5) Turn that substrate maintenance convex surface downward, and the pressurization member of said orientation arrangement is made to face said stage as an example in this case, and the case where both substrates are stuck can be mentioned, extending a liquid crystal ingredient among both substrates by moving this stage in accordance with said radii orbit.

(1-2) A liquid crystal ingredient layer is arranged between the 1st [which has flexibility in itself], and 2nd substrates. The process which this liquid crystal ingredient layer is the manufacture approach of the liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall which closes this periphery section between substrates, and arranges a seal wallplate at least to one side among the 1st substrate and the 2nd substrate, The process made to hold among the 1st substrate and the 2nd substrate to this substrate maintenance convex surface of the stage which has the substrate maintenance convex surface of the curvature according to the deflection of the liquid crystal display curved-surface panel which is going to obtain a predetermined edge at least of one substrate, While the predetermined edge of the substrate of this another side puts on said predetermined edge of one substrate

on said stage, supporting the substrate of another side by this substrate back face of a pressurization member that has the substrate support convex surface or substrate support flat surface of larger curvature than the curvature of the substrate maintenance convex surface of this stage. The process which forms the condition that the liquid crystal ingredient has been arranged, among these both substrates, While rotating this stage centering on the radius-of-curvature core of the substrate maintenance convex surface, fastening both the substrates that predetermined edges piled up between this stage and a pressurization member. While sticking both substrates from said superposition edge side, extending a liquid crystal ingredient among both substrates by rotating a pressurization member centering on the radius-of-curvature core of the substrate support convex surface, or making it move in the direction of the substrate support flat surface. The manufacture approach of a liquid crystal display curved-surface panel including the substrate lamination process of making the stuck part holding to the substrate maintenance convex surface of said stage.

[0019] Although facing up or downward are sufficient as the sense of the substrate maintenance convex surface of said stage in this approach, facing down can be mentioned as an example of representation. In this case, this downward substrate maintenance convex surface is faced a pressurization member from a lower part.

(1-2-1) In this approach, said stage may be offered with the roller which has for example, a substrate maintenance peripheral surface.

(1-3) A liquid crystal ingredient layer is arranged between the 1st [which has flexibility in itself], and 2nd substrates. The process which this liquid crystal ingredient layer is the manufacture approach of the liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall which closes this periphery section between substrates, and arranges a seal wallplate at least to one side among the 1st substrate and the 2nd substrate, The process made to hold to this substrate maintenance concave bend side of the stage which has the substrate maintenance concave bend side of the curvature according to the deflection of the liquid crystal display curved-surface panel which is going to obtain one substrate among the 1st substrate and the 2nd substrate, The process made to hold at least to this substrate maintenance convex surface of the pressurization member of the substrate of another side which has the substrate maintenance convex surface of larger curvature than the curvature of the substrate maintenance concave bend side of this stage for a predetermined edge, The process which forms the condition that the liquid crystal ingredient has been arranged, among these both substrates while while was held in the substrate maintenance concave bend side of said stage and said predetermined edge of the substrate of another side held at the predetermined edge of a substrate at the substrate maintenance convex surface of said pressurization member piles up, While rotating this stage centering on the radius-of-curvature core of the substrate maintenance concave bend side, fastening both the substrates that predetermined edges piled up between said stages and pressurization members. While sticking both substrates from said superposition edge side, extending a liquid crystal ingredient among both substrates by rotating a pressurization member centering on the radius-of-curvature core of the substrate maintenance convex surface. The manufacture approach of a liquid crystal display curved-surface panel including the substrate lamination process released from the substrate maintenance convex surface of this pressurization member one by one from the part on which the substrate of another side on a pressurization member was stuck at one substrate on said stage.

[0020] Although facing up or downward are sufficient as the sense of the substrate maintenance concave bend side of said stage in this approach, facing up can be mentioned as an example of representation. In this case, this upward substrate maintenance concave bend side is faced a pressurization member from the upper part.

In this approach for example, (1-3-1) As said pressurization member Have a centrum and the inhalation-of-air hole for substrate suction which is open for free passage from this centrum to a substrate maintenance convex surface is formed. The diaphragm for forming an inhalation-of-air room in this centrum to the substrate maintenance convex surface part of the substrate of another side in front of substrate lamination which should hold said predetermined edge at least is built in, and the pressurization member by which this inhalation-of-air room is connected to an exhaustor can be adopted.

In this case, the sequential release from the pressurization member convex surface of the part stuck on one substrate on said stage of the substrate of another side on the pressurization member in said substrate lamination process is made because the inhalation-of-air hole in a pressurization member shifts to an atmospheric-air free passage field from said inhalation-of-air room.

(1-3-2) Moreover, the pressurization member which considered as said pressurization member, for example, formed the temporary maintenance adhesives of adhesive strength weaker than the lamination force of both the substrates in said substrate lamination process in said substrate maintenance convex surface is also employable. In this case, it is made to make the substrate of another side in front of lamination hold with these temporary maintenance adhesives, and sequential release from the pressurization member convex surface of the part stuck on one substrate on said stage of the substrate of another side on the pressurization member in said substrate lamination process is performed with the difference of the lamination force of said both substrates, and the adhesive strength of the temporary maintenance adhesives of a pressurization member.

[0021] When extending the liquid crystal ingredient among both substrates in said substrate lamination process, you may make it collect the liquid crystal ingredients leaked out of said seal wallplate in the liquid crystal ingredient receptacle section also in the manufacture approach of which liquid crystal display curved-surface panel of (1-2) explained above (1-1) and (1-3), in order to control the futility of a liquid crystal ingredient.

[0022] For example, towards a top, the substrate maintenance curved surface of said stage collects the liquid crystal ingredients leaked out of said seal wallplate in the liquid crystal ingredient receptacle section, when extending the liquid crystal ingredient among both substrates in said substrate lamination process, and this liquid crystal ingredient receptacle section can be made into the concave formed in said stage so that opening might attend both the handle parts and lamination trailer of both the substrates stuck.

[0023] Moreover, for example, when extending the liquid crystal ingredient among both substrates in said substrate lamination process, the liquid crystal ingredients leaked out of said seal wallplate are collected in the liquid crystal ingredient receptacle section, and this liquid crystal ingredient receptacle section can be used as the liquid crystal ingredient receptacle container which opening faces both the handle parts of both the substrates stuck [near said pressurization member].

[0024] the manufacture approach of which liquid crystal display curved-surface panel of the above (1-1), (1-2), and (1-3) -- also setting -- said 1st and 2nd substrate -- respectively -- being alike -- the electrode for driving a liquid crystal ingredient layer and usually displaying an image is prepared.

[0025] furthermore, an insulator layer and (or) the orientation film may be prepared if needed.

[0026] Moreover, the liquid crystal ingredient layer in a liquid crystal display curved-surface panel may contain the spacer for equalizing both substrates spacing (gap) in each part of a panel. This liquid crystal ingredient layer may contain the resin structure like a resin column for 1 or two or more purposes of equalizing both substrates spacing in each part of a panel, combining both substrates of each other.

[0027] This spacer may be beforehand sprinkled by the substrate, for example, the substrate which arranges said seal wallplate. You may distribute in the liquid crystal ingredient. The seal wall may contain the spacer.

[0028] Said resin structure can be beforehand formed in a substrate using thermoplastics.

[0029] As said seal wallplate, resin can be used, for example. The thermosetting resin furthermore hardened by baking as an example can be mentioned.

[0030] the seal wallplate with which the lamination of both the substrates performed also in the manufacture approach of which liquid crystal display curved-surface panel of the above (1-1), (1-2), and (1-3), enclosing a liquid crystal ingredient consists of this resin -- or it can carry out further using the resin structure. For example, in order to perform lamination of a substrate smoothly using this seal wallplate etc., it may be made to perform the lamination process of said substrate to the bottom of heating.

[0031] Moreover, the lamination process of said substrate is performed to the bottom of temporary sealing doubling temperature, and temporary sealing doubling is carried out and it may be made to carry

out this lamination of both the substrates with which the liquid crystal ingredient was enclosed to the bottom of this lamination temperature. The liquid crystal display curved-surface panel which can maintain a predetermined curved surface stably over a long period of time by doing so can be obtained. [0032] The lamination of the substrate accompanied by heating is suitable when adopting an ingredient like the thermosetting resin hardened by baking as a seal wallplate.

[0033] This lamination process of said both substrates is arranged on this substrate maintenance curved surface of the electrode holder which has the substrate maintenance side (substrate maintenance curved surface according to the deflection of the liquid crystal display curved-surface panel which it is going to obtain typically) of for example, predetermined curvature, and it may be made to perform it. The liquid crystal display curved-surface panel which can maintain a predetermined curved surface stably over a long period of time by this can be obtained more certainly.

[0034] Also in the manufacture approach of which liquid crystal display curved-surface panel of the above (1-1), (1-2), and (1-3), for example, a pressurization roller can be used as said pressurization member.

[0035] Moreover, in order to perform the lamination process of said substrate to the bottom of heating, a heating pressurization roller with a built-in heater may be used as said pressurization member.

[0036] In order to perform the lamination process of said substrate to the bottom of heating, the member for heating may be installed and used for said pressurization member. In this case, a heating roller with a heater built-in [a pressurization roller / as said heating component] may be used as said pressurization member.

[0037] In the manufacture approach of which liquid crystal display curved-surface panel of the above (1-1), (1-2), and (1-3), it cannot be overemphasized that alignment of both substrates is performed before lamination process initiation of a substrate. For example, what is necessary is just to perform alignment of both substrates where alignment of the lamination of both substrates is carried out mutually so that [in case the predetermined edges of both substrates are piled up, or] it may be made in advance of it.

[0038] The alignment approach of this substrate can adopt the alignment approach of various kinds of substrates or a panel which can adopt the approach of arbitration as long as it is convenient, for example, is learned in itself.

[0039] The liquid crystal display curved-surface panel of a laminating mold can also be easily obtained by carrying out the adhesion laminating of two or more liquid crystal display curved-surface panels obtained by one of the approaches explained above.

[0040] Also in the manufacture approach of which liquid crystal display curved-surface panel of the above (1-1), (1-2), and (1-3), although the substrate maintenance by the substrate maintenance curved surface of said stage is not limited to it, it can mention the case where suction maintenance of the substrate is carried out as an example of representation through the inhalation-of-air hole prepared in the stage.

[0041] Moreover, in the manufacture approach of the liquid crystal display curved-surface panel the above (1-1), although maintenance of the superposition edge of both the substrates in said TEJI is not limited to it, the holder formed, for example in this stage can perform it.

(2) The manufacture approach of a liquid crystal display curved-surface panel of forming this monolayer liquid crystal display panel in a curved-surface panel in the phase which carries out the laminating of the liquid crystal display panel of two or more monolayers, and obtaining the liquid crystal display curved-surface panel of a laminating mold (the manufacture approach of the 2nd type)

This invention offers the approach of of the following (2-1), (2-2), (2-3), and (2-4) as this type of an approach. Each approach explained below can obtain a liquid crystal display curved-surface panel easily.

(2-1) It is the approach of carrying out the laminating of the liquid crystal display panel which has flexibility in itself, and manufacturing a laminating mold liquid crystal display curved-surface panel. The process which forms adhesives at least in one side among the fields of the 1st [which should be carried out a laminating], and 2nd liquid crystal display panels which should be stuck mutually, The

process made to hold on this panel maintenance curved surface of the stage which has the panel maintenance curved surface of the curvature according to the deflection of the laminating mold liquid crystal display curved-surface panel which is going to obtain the 1st liquid crystal display panel, The process which carries out superposition maintenance of the predetermined edge of the 2nd liquid crystal display panel at the predetermined edge of the 1st liquid crystal display panel held on the panel maintenance curved surface of said stage, This pressurization member and a stage are centered on the radius-of-curvature core of said panel maintenance curved surface of this stage, fastening both the liquid crystal display panel that predetermined edges piled up on said stage between the pressurization members and these stages which counter this stage. The manufacture approach of a laminating mold liquid crystal display curved-surface panel including the panel lamination process which sticks both the liquid crystal display panel with said adhesives from said superposition edge side by carrying out radii migration relatively.

[0042] A concave bend side or a convex surface is sufficient as the panel maintenance curved surface of said stage.

[0043] Moreover, at a panel lamination process, a stage is arranged in an orientation, for example, a pressurization member may be moved, a pressurization member may be arranged in an orientation, and a stage may be moved.

(2-1-1) For example, the panel maintenance curved surface of said stage is made into a concave bend side, this stage is arranged in an orientation (turning the concave bend side upwards, for example) at said panel lamination process, and you may make it stick both the liquid crystal display panel by moving said pressurization member in accordance with the radii orbit centering on the radius-of-curvature core of the panel maintenance concave bend side of this stage.

(2-1-2) Moreover, the panel maintenance curved surface of said stage is made into a concave bend side, said pressurization member is arranged in an orientation at said panel lamination process, and you may make it stick both the liquid crystal display panel by moving this stage in accordance with the radii orbit centering on the radius-of-curvature core of this (turning the concave bend side upwards, for example) panel maintenance concave bend side.

(2-1-3) Moreover, you may make it stick both the liquid crystal display panel by making the panel maintenance curved surface of said stage into a convex surface, arranging this stage at said panel lamination process in an orientation (turning the convex surface upwards, for example, or turning downward), and moving said pressurization member in accordance with the radii orbit centering on the radius-of-curvature core of the panel maintenance convex surface of this stage.

(2-1-4) Moreover, the panel maintenance curved surface of said stage is made into a convex surface, said pressurization member is arranged in an orientation at said panel lamination process, and you may make it stick both the liquid crystal display panel by moving this stage in accordance with the radii orbit centering on the radius-of-curvature core of this (turning the convex surface upwards, for example, or turning downward) panel maintenance convex surface.

(2-2) It is the approach of carrying out the laminating of the liquid crystal display panel which has flexibility in itself, and manufacturing a laminating mold liquid crystal display curved-surface panel. The process which forms adhesives at least in one side among the fields of the 1st [which should be carried out a laminating], and 2nd liquid crystal display panels which should be stuck mutually, The process made to hold to this panel maintenance convex surface of the stage which has the panel maintenance convex surface of the curvature according to the deflection of the laminating mold liquid crystal display curved-surface panel which is going to obtain a predetermined edge at least of the 1st liquid crystal display panel, The 2nd liquid crystal display panel while supporting by this panel back face of a pressurization member that has the panel support convex surface or panel support flat surface of larger curvature than the curvature of the panel maintenance convex surface of this stage -- this -- with the process which lays the predetermined edge of the 2nd liquid crystal display panel on top of said predetermined edge of the 1st liquid crystal display panel on said stage While rotating this stage centering on the radius-of-curvature core of the panel maintenance convex surface, fastening both the liquid crystal display panel that predetermined edges piled up between this stage and a pressurization

member While sticking both the liquid crystal display panel with said adhesives from said superposition edge side by rotating a pressurization member centering on the radius-of-curvature core of the panel support convex surface, or making it move in the direction of the panel support flat surface The manufacture approach of a laminating mold liquid crystal display curved-surface panel including the panel lamination process of making the stuck part holding to the panel maintenance convex surface of said stage.

[0044] Although facing up or downward are sufficient as the sense of the panel maintenance convex surface of said stage in this approach, facing down can be mentioned as an example of representation. In this case, this downward panel maintenance convex surface is faced a pressurization member from a lower part.

(2-2-1) In this approach, said stage may be offered with the roller which has for example, a panel maintenance peripheral surface.

(2-3) It is the approach of carrying out the laminating of the liquid crystal display panel which has flexibility in itself, and manufacturing a laminating mold liquid crystal display curved-surface panel. The process which forms adhesives at least in one side among the fields of the 1st [which should be carried out a laminating], and 2nd liquid crystal display panels which should be stuck mutually, The process made to hold to this panel maintenance concave bend side of the stage which has the panel maintenance concave bend side of the curvature according to the deflection of the laminating mold liquid crystal display curved-surface panel which is going to obtain the 1st liquid crystal display panel, The process made to hold at least to this panel maintenance convex surface of the pressurization member of the 2nd liquid crystal display panel which has the panel maintenance convex surface of larger curvature than the curvature of the panel maintenance concave bend side of said stage for a predetermined edge, The process which lays said predetermined edge of the 2nd liquid crystal display panel held in the panel maintenance convex surface of said pressurization member on top of the predetermined edge of the 1st liquid crystal display panel held in the panel maintenance concave bend side of said stage, While rotating this stage centering on the radius-of-curvature core of the panel maintenance concave bend side, fastening both the liquid crystal display panel that predetermined edges piled up between said stages and pressurization members While sticking both the liquid crystal display panel with said adhesives from said superposition edge side by rotating a pressurization member centering on the radius-of-curvature core of the panel maintenance convex surface The manufacture approach of a laminating mold liquid crystal display curved-surface panel including the panel lamination process released from the panel maintenance convex surface of this pressurization member one by one from the part on which the 2nd liquid crystal display panel on a pressurization member was stuck at the 1st liquid crystal display panel on said stage.

[0045] Although facing up or downward are sufficient as the sense of the panel maintenance concave bend side of said stage in this approach, facing up can be mentioned as an example of representation. In this case, this upward panel maintenance concave bend side is faced a pressurization member from the upper part.

In this approach for example, (2-3-1) As said pressurization member Have a centrum and the inhalation-of-air hole for panel suction which is open for free passage from this centrum to a panel maintenance convex surface is formed. The diaphragm for forming an inhalation-of-air room in this centrum to the panel maintenance convex surface part of the 2nd liquid crystal display panel in front of panel lamination which should hold said predetermined edge at least is built in, and the pressurization member by which this inhalation-of-air room is connected to an exhaustor can be adopted. In this case, the sequential release from the pressurization member convex surface of the part stuck on the 1st liquid crystal display panel on said stage of the 2nd liquid crystal display panel on the pressurization member in said panel lamination process is made because the inhalation-of-air hole in a pressurization member shifts to an atmospheric-air free passage field from said inhalation-of-air room.

(2-3-2) Moreover, the pressurization member which formed the temporary maintenance adhesives of adhesive strength weaker than the lamination force of both the liquid crystal display panel by said adhesives in said panel lamination process in said panel maintenance convex surface as a pressurization

member is also employable. In this case, it is made to make the 2nd liquid crystal display panel in front of lamination hold with these temporary maintenance adhesives, and the sequential release from the pressurization member convex surface of the part stuck on the 1st liquid crystal display panel on said stage of the 2nd liquid crystal display panel on the pressurization member in said panel lamination process is made to perform with the difference of the lamination force of said both liquid crystal display panel, and the adhesive strength of the temporary maintenance adhesives of a pressurization member.

(2-4) In the manufacture approach of one of said laminating mold liquid crystal display curved-surface panels The liquid crystal display panel which should be carried out a laminating three or more at a certain time about the liquid crystal display panel of the 3rd henceforth It is considered that the liquid crystal display panel which should be stuck on a degree while considering that the stuck liquid crystal display panel which is obtained according to said panel lamination process is said 1st liquid crystal display panel is said 2nd liquid crystal display panel. The manufacture approach of the laminating mold liquid crystal display curved-surface panel which sticks the following liquid crystal display panel at a time on one already stuck liquid crystal display panel by repeating said each process.

[0046] Also in the manufacture approach of which laminating mold liquid crystal display curved-surface panel of the above (2-1), (2-2), (2-3), and (2-4), for example, a pressurization roller can be used as said pressurization member.

[0047] Moreover, in order to perform the lamination process of said panel to the bottom of heating if needed, a heating pressurization roller with a built-in heater may be used as said pressurization member.

[0048] Also in the manufacture approach of which laminating mold liquid crystal display curved-surface panel of the above (2-1), (2-2), (2-3), and (2-4), although maintenance of the liquid crystal display panel by the panel maintenance curved surface of said stage is not limited to it, it can mention the case where suction maintenance of the liquid crystal display panel is carried out as an example of representation through the inhalation-of-air hole prepared in the stage.

[0049] Moreover, in the manufacture approach of the laminating mold liquid crystal display curved-surface panel the above (2-1), although maintenance of the superposition edge of both the liquid crystal display panel in said TEJI is not limited to it, the holder formed, for example in this stage can perform it.

[0050] Also in the manufacture approach of which liquid crystal display curved-surface panel of the above (2-1), (2-2), (2-3), and (2-4) As a process which forms adhesives at least in one side among the fields of the liquid crystal display panel which should be carried out a laminating which should be stuck mutually the adhesives (a double faced adhesive tape --) which paste a liquid crystal display panel side beforehand and with which the front face was still covered with the protection sheet The process at which this protection sheet is removed from adhesive tape etc., and an adhesion side is exposed, and the process which is handicraft or applies adhesives to a liquid crystal display panel side with an adhesives coater can be illustrated. How to form adhesives is arbitration as long as it is convenient. Although you may apply at least to one side extensively among both liquid crystal display panels when preparing by spreading, it arranges into the lamination initiation edge of one [at least] panel, or other suitable parts, and you may make it extend this among both panels with advance of lamination.

[0051] Moreover, in the manufacture approach of which liquid crystal display curved-surface panel of the above (2-1), (2-2), (2-3), and (2-4), it cannot be overemphasized that alignment of both the liquid crystal display panel is performed before lamination process initiation of a liquid crystal display panel. For example, what is necessary is just to perform alignment of both the liquid crystal display panel where alignment of the lamination of both the liquid crystal display panel is carried out mutually so that [in case the predetermined edges of both the liquid crystal display panel are piled up, or] it may be made in advance of it.

[0052] The alignment approach of this liquid crystal display panel can adopt the alignment approach of various kinds of substrates or a panel which can adopt the approach of arbitration as long as it is convenient, for example, is learned in itself.

[0053] About the point of adhesives, and the point of alignment, it is the same also in the manufacture approach of the 3rd type mentioned later.

[0054] Stress relief heat treatment may be performed to the laminating mold liquid crystal display curved-surface panel obtained by the manufacture approach of one of said laminating mold liquid crystal display curved-surface panels. The laminating mold liquid crystal display curved-surface panel which can maintain a predetermined curved-surface condition stably over a long period of time by doing so can be obtained.

(3) The manufacture approach of the liquid crystal display curved-surface panel which forms this liquid crystal display panel in a curved-surface panel in the phase which fixes the liquid crystal display panel of a monolayer to a liquid crystal display panel attachment component (the manufacture approach of the 3rd type)

This invention offers the approach of of the following (3-1), (3-2), and (3-3) as this type of an approach. Each approach explained below can obtain a liquid crystal display curved-surface panel easily.

(3-1) Are the approach of manufacturing a liquid crystal display curved-surface panel from the liquid crystal display panel which has flexibility in itself, and set from the above (2-1) at either of (2-3) to the manufacture approach of the laminating mold liquid crystal display curved-surface panel a publication. The panel maintenance shell of the deflection which replaced with said 1st liquid crystal display panel, and imitated the deflection of the liquid crystal display curved-surface panel which it is going to obtain is adopted. The liquid crystal display panel which should be formed in a liquid crystal display curved-surface panel as said 2nd liquid crystal display panel is adopted. The manufacture approach of a liquid crystal display curved-surface panel of obtaining the liquid crystal display curved-surface panel held in this panel maintenance shell by using this panel maintenance shell as said 1st liquid crystal display panel, and carrying out said each process by using as said 2nd liquid crystal display panel the liquid crystal display panel which should be formed in a liquid crystal display curved-surface panel.

(3-2) The process for which the panel maintenance shell of the deflection which imitated the deflection of the liquid crystal display curved-surface panel which is the approach of manufacturing a liquid crystal display curved-surface panel, and it is going to obtain from the liquid crystal display panel which has flexibility in itself is prepared, This panel maintenance shell and the process which forms adhesives at least in one side among the fields of a liquid crystal display panel which should be stuck mutually, The process made to hold to this panel maintenance convex surface of the stage which has the panel maintenance convex surface of larger curvature than the curvature of the curved surface of said liquid crystal display panel which should stick the liquid crystal display panel of said panel maintenance shell for a predetermined edge at least, The process which lays the predetermined edge of this panel maintenance shell on top of the predetermined edge of the liquid crystal display panel held on said stage, supporting said panel maintenance shell by the pressurization member which has a convex surface for this panel maintenance shell support, While rotating this stage centering on the radius-of-curvature core of the panel maintenance convex surface, fastening the panel maintenance shell and liquid crystal display panel which predetermined edges piled up between said stages and pressurization members The lamination process which obtains the liquid crystal display curved-surface panel held in this panel maintenance shell by sticking a panel maintenance shell and a liquid crystal display panel with said adhesives from said superposition edge side by rotating a pressurization member centering on the radius-of-curvature core of the convex surface, The manufacture approach of a ***** liquid crystal display curved-surface panel.

(3-3) In the manufacture approach of the above (3-1) or (3-2) the liquid crystal display curved-surface panel a publication The liquid crystal display panel which should be carried out a laminating two or more at a certain time about the liquid crystal display panel of the 2nd henceforth By considering that the liquid crystal display curved-surface panel held in the panel maintenance shell obtained according to said lamination process is said panel maintenance shell, and repeating said each process The manufacture approach of the liquid crystal display curved-surface panel which sticks the following liquid crystal display panel at a time on one liquid crystal display curved-surface panel held in the panel maintenance shell.

[0055] Said panel maintenance shell can be used as the protective cover of a liquid crystal display panel also in which manufacture approach of of (3-1), (3-2), and (3-3). For example, it can consider as a

protective cover by using a panel maintenance shell as a transparence shell (for example, transparence resin shell), and carrying out the laminating of this to the liquid crystal display panel side located in an image observation side.

[0056] Stress relief heat treatment may be performed to the liquid crystal display curved-surface panel obtained by one manufacture approach of (3-1), (3-2), and (3-3). The liquid crystal display curved-surface panel which can maintain a predetermined curved-surface condition stably over a long period of time by doing so can be obtained.

[0057] Also in the manufacture approach of which liquid crystal display curved-surface panel of the above (3-1), (3-2), and (3-3), although maintenance of the panel maintenance shell by said stage or a liquid crystal display panel is not limited to it, it can mention the case where suction maintenance of a panel maintenance shell or the liquid crystal display panel is carried out as an example of representation through the inhalation-of-air hole prepared in the stage.

[0058] Moreover, in the manufacture approach of the liquid crystal display curved-surface panel the above (3-1), when holding the superposition edge of a panel maintenance shell and a liquid crystal display panel in said TEJI, although this maintenance is not limited to it, the holder formed, for example in this stage can perform it.

[0059] The manufacturing installation of the liquid crystal display curved-surface panel of the following (4-1), (4-2), and (4-3) also offers this invention.

[0060] Each of these manufacturing installations can manufacture a liquid crystal display curved-surface panel easily.

(4-1) The stage which has the board maintenance curved surface of the curvature according to the deflection of the liquid crystal display curved-surface panel which is the manufacturing installation of a liquid crystal display curved-surface panel, and it is going to obtain, The pressurization member which counters the board maintenance curved surface of said stage, and the elastic member which turns this pressurization member to the board maintenance curved surface of this stage, and energizes it possible [retreat], The manufacturing installation of a liquid crystal display curved-surface panel equipped with the migration device for carrying out radii migration of the radius-of-curvature core of the board maintenance curved surface of this stage for said stage and a pressurization member relatively as a core.

[0061] In this manufacturing installation, it is using the board maintenance curved surface of a stage as a maintenance curved surface of the substrate for liquid crystal display curved-surface panel formation, for example, the manufacture approach of (1-1) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the 1st aforementioned type.

[0062] Moreover, the manufacture approach of (2-1) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the laminating mold of the 2nd aforementioned type by using the board maintenance curved surface of a stage as a liquid crystal display panel maintenance curved surface.

[0063] Moreover, the approach of using the manufacture approach of the laminating mold liquid crystal display curved-surface panel the above (2-1) among the manufacture approaches of (3-1) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the 3rd aforementioned type by using the board maintenance curved surface of a stage as a curved surface holding a panel maintenance shell.

[0064] A concave bend side or a convex surface is sufficient as the board maintenance curved surface of said stage.

[0065] Moreover, a stage is arranged in an orientation, for example, a pressurization member may be moved, a pressurization member may be arranged in an orientation, and a stage may be moved.

(4-1-1) For example, it is a concave bend side, and this stage is arranged in an orientation (turning the concave bend side upwards, for example), and the board maintenance curved surface of said stage is good also as said pressurization member being movable in accordance with the radii orbit centering on the radius-of-curvature core of the board maintenance concave bend side of this stage.

(4-1-2) Moreover, the board maintenance curved surface of said stage is a concave bend side, and said pressurization member is arranged in an orientation and it is good also as said stage being movable in

accordance with the radii orbit centering on the radius-of-curvature core of the board maintenance curved surface.

[0066] In this case, said pressurization member is arranged in the lowest orientation on the circle which passes along this pressurization member centering on the radius-of-curvature core of the board maintenance concave bend side of said stage, that board maintenance concave bend side may be turned upwards, and this stage may be arranged.

(4-1-3) Moreover, the board maintenance curved surface of said stage is a convex surface, and this stage (turning the convex surface upwards, for example, or turning downward) It is arranged in an orientation and is good also as said pressurization member being movable in accordance with the radii orbit centering on the radius-of-curvature core of the board maintenance convex surface of this stage.

(4-1-4) Moreover, the board maintenance curved surface of said stage is a convex surface, and said pressurization member is arranged in an orientation and it is good also as said stage being movable in accordance with the radii orbit centering on the radius-of-curvature core of this (turning the convex surface upwards, for example, or turning downward) board maintenance convex surface.

(4-1-5) As an example in this case, said stage can mention the case where turned that board maintenance convex surface downward, and the pressurization member of said orientation arrangement is faced it.

(4-2) The stage which has the board maintenance convex surface of the curvature according to the deflection of the liquid crystal display curved-surface panel which is the manufacturing installation of a liquid crystal display curved-surface panel, and it is going to obtain, The pressurization member which counters the board maintenance convex surface of said stage, and has the board support convex surface or board support flat surface of larger curvature than the curvature of this board maintenance convex surface, The manufacturing installation of a liquid crystal display curved-surface panel equipped with the migration device for rotating a pressurization member centering on the radius-of-curvature core of the board support convex surface, or making it move in the direction of the board support flat surface, while rotating this stage centering on the radius-of-curvature core of the board maintenance convex surface.

[0067] In this manufacturing installation, it is using the board maintenance convex surface of a stage as a maintenance curved surface of the substrate for liquid crystal display curved-surface panel formation, for example, the manufacture approach of (1-2) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the 1st aforementioned type.

[0068] Moreover, the manufacture approach of (2-2) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the laminating mold of the 2nd aforementioned type by using the board maintenance convex surface of a stage as a liquid crystal display panel maintenance curved surface.

[0069] Moreover, the approach of using the manufacture approach of the laminating mold liquid crystal display curved-surface panel the above (2-2) among the manufacture approaches of (3-1) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the 3rd aforementioned type by using the board maintenance curved surface of a stage as a curved surface holding a panel maintenance shell.

[0070] this (4-2) Although facing up or downward are sufficient as the sense of the board maintenance convex surface of said stage in a manufacturing installation, facing down can be mentioned as an example of representation. In this case, this downward board maintenance convex surface is faced a pressurization member from a lower part.

(4-2-1) 4-2 In a manufacturing installation, said stage may be offered with the roller which has for example, a board maintenance peripheral surface.

(4-3) The stage which has the board maintenance concave bend side of the curvature according to the deflection of the liquid crystal display curved-surface panel which is the manufacturing installation of a liquid crystal display curved-surface panel, and it is going to obtain, The pressurization member which counters the board maintenance concave bend side of said stage, and has the board maintenance convex surface of larger curvature than the curvature of this board maintenance concave bend side, The manufacturing installation of a liquid crystal display curved-surface panel equipped with the device for

rotating a pressurization member centering on the radius-of-curvature core of the board maintenance convex surface, while rotating this stage centering on the radius-of-curvature core of the board maintenance concave bend side.

[0071] In this manufacturing installation, it is using the board maintenance concave bend side of a stage as a maintenance curved surface of the substrate for liquid crystal display curved-surface panel formation, for example, the manufacture approach of (1-3) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the 1st aforementioned type.

[0072] Moreover, the manufacture approach of (2-3) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the laminating mold of the 2nd aforementioned type by using the board maintenance concave bend side of a stage as a liquid crystal display panel maintenance curved surface.

[0073] Moreover, the approach of using the manufacture approach of the laminating mold liquid crystal display curved-surface panel the above (2-3) among the manufacture approaches of (3-1) can be enforced during the manufacture approach of the liquid crystal display curved-surface panel of the 3rd aforementioned type by using the board maintenance concave bend side of a stage as a curved surface holding a panel maintenance shell.

[0074] Although facing up or downward are sufficient as the sense of the board maintenance concave bend side of said stage in this equipment, facing up can be mentioned as an example of representation. In this case, this upward board maintenance concave bend side is faced a pressurization member from the upper part.

(4-3-1) 4-3 In a manufacturing installation For example, said pressurization member has a centrum and the inhalation-of-air hole for board suction which is open for free passage from this centrum to a board maintenance convex surface is formed. The diaphragm for forming an inhalation-of-air room in this centrum to the board maintenance convex surface part located in the upstream from the closest-approach part of a pressurization member and a stage in the migration direction of this board maintenance convex surface is built in, and this inhalation-of-air room is connected to an exhaustor. (4-3-2) Moreover, for example, said pressurization member may have the temporary maintenance adhesives for board temporary maintenance in the board maintenance convex surface.

[0075] Also in the manufacturing installation of which liquid crystal display curved-surface panel of the above (4-1), (4-2), and (4-3), when using for manufacture of the liquid crystal display curved-surface panel of the 1st type, in order to control the futility of a liquid crystal ingredient, the liquid crystal ingredient receptacle section which collects liquid crystal ingredients may be prepared.

[0076] as the example in that case -- the following A and B -- two manufacturing installations can be illustrated.

(A) It is a manufacturing installation for the manufacture of a liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall with which a liquid crystal ingredient layer is arranged between the 1st and 2nd substrates, and this liquid crystal ingredient layer closes this periphery section between substrates. The board maintenance curved surface of said stage is turned upwards, and it has the liquid crystal ingredient receptacle section which collects liquid crystal ingredients. One substrate is held among said 1st and 2nd substrates on the board maintenance curved surface of said stage. While was held on this board maintenance curved surface, and while the predetermined edge of the substrate of another side is held at the predetermined edge of a substrate at a superposition condition When sticking both substrates, extending a liquid crystal ingredient among both substrates by moving this pressurization member and a stage relatively, fastening both substrates between said pressurization members and said stages from the condition that the liquid crystal ingredient has been arranged, among these both substrates It is the manufacturing installation of the liquid crystal display curved-surface panel made into the concave formed in said stage so that opening might attend both the handle parts and lamination trailer of both substrates on which said liquid crystal ingredient receptacle section is stuck so that the liquid crystal ingredients which are boiled and are leaked out of said seal wallplate may be collected.

(B) It is a manufacturing installation for the manufacture of a liquid crystal display curved-surface panel

by which surrounding enclosure is carried out with the seal wall with which a liquid crystal ingredient layer is arranged between the 1st and 2nd substrates, and this liquid crystal ingredient layer closes this periphery section between substrates. Have the liquid crystal ingredient receptacle section which collects liquid crystal ingredients, and one substrate is held among said 1st and 2nd substrates on the board maintenance curved surface of said stage. While was held on this board maintenance curved surface, and while the predetermined edge of the substrate of another side is held at the predetermined edge of a substrate at a superposition condition When sticking both substrates, extending a liquid crystal ingredient among both substrates by moving this pressurization member and a stage relatively, fastening both substrates between said pressurization members and said stages from the condition that the liquid crystal ingredient has been arranged, among these both substrates It is the manufacturing installation of the liquid crystal display curved-surface panel used as the liquid crystal ingredient receptacle container which opening faces both the handle parts of both the substrates with which said liquid crystal ingredient receptacle section is stuck [near said pressurization member] so that the liquid crystal ingredients which are boiled and are leaked out of said seal wallplate may be collected.

[0077] Said pressurization member can be used for example, as a pressurization roller also in which manufacturing installation explained above.

[0078] Moreover, for example, said pressurization member can also be used as a heating pressurization roller with a built-in heater if needed.

[0079] Furthermore, the member for heating may be installed, for example in said pressurization member side by side. In this case, a pressurization member is used as a pressurization roller and a heating component is good also as a heating roller with a built-in heater.

[0080]

[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing below.

[0081] Drawing 1 is drawing showing the outline configuration of one example of the manufacturing installation of a liquid crystal display curved-surface panel.

[0082] A liquid crystal ingredient layer is arranged between the 1st [which has flexibility in itself], and 2nd substrates, and this manufacturing installation can be used for the manufacture of a liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall with which this liquid crystal ingredient layer closes this periphery section between substrates.

[0083] This manufacturing installation has the stage 11 in which the inhalation-of-air room 111 was formed inside.

[0084] the upper wall 112 of a stage 11 -- if it puts in another way, the top face of the head-lining wall 112 of the inhalation-of-air room 111 is formed in the board maintenance concave bend side 113. The board maintenance concave bend side 113 is a substrate maintenance concave bend side of the curvature according to the deflection of the liquid crystal display curved-surface panel which it is going to obtain here. This concave bend side 113 is arranged in the orientation towards the top.

[0085] The inhalation-of-air hole 114 for substrate suction maintenance of a large number which are open for free passage in the inhalation-of-air room 111 from this substrate maintenance concave bend side 113 is formed in the head-lining wall 112.

[0086] The exhaust air pump P is connected to the inhalation-of-air room 111 through Valve V.

[0087] Moreover, the substrate holder 115 is formed in the edge of the substrate maintenance concave bend side 113 at the head-lining wall 112.

[0088] From the upper part, the pressurization member 12 countered the substrate maintenance concave bend side 113, and it is faced.

[0089] A surface is the roller formed by India rubber, and the pressurization member 12 builds the heater 121 for heating in the interior here. That is, the pressurization member 12 is a pressurization heating roller here.

[0090] The roller 12 is supported by drawing 1 between the lower limit sections of the support arm 13 of the pair by which only one side is illustrated. The roller 12 is supported possible [rise and fall] a little and free [rotation] on this arm by the arm 13 of this pair. The spring 14 is attached in the lower limit

section of each arm 13, and this spring always turned the roller 12 to the substrate maintenance concave bend side 113, and is energizing it.

[0091] Radii migration (radii rocking) of the arm 13 of a pair can be carried out with the drive which omitted illustration centering on the shaft 131. The core of a shaft 131 is made in agreement focusing on [C1] the radius of curvature of the substrate maintenance curved surface 113. Therefore, a roller 12 is movable in accordance with the radii orbit centering on the radius-of-curvature core of the substrate maintenance curved surface 113.

[0092] The manufacture of the liquid crystal display curved-surface panel using this equipment is as follows.

[0093] First, alignment of the 1st substrate S1 is carried out to the predetermined location of the substrate maintenance concave bend side 113, and it is made to hold in it. This substrate maintenance is performed by attracting a substrate by opening Valve V and operating the exhaust air pump P.

[0094] The 1st substrate S1 is a substrate which has the itself flexibility of transparence here, and the electrode is formed beforehand. Depending on the case, an insulator layer and the orientation film may also be formed if needed. Spacer SP is distributed while the charge SL of a seal wallplate is arranged along with the periphery section by suitable technique, such as a print, further beforehand. The light absorption layer BK is formed in substrate S1 external surface further beforehand. A substrate S1 turns the seal wallplate etc. upwards, and is made to hold it on the substrate maintenance curved surface 113.

[0095] Although the seal wallplate SL is not limited to it, thermosetting resin (for example, 2 liquid hybrid model epoxy resin) is adopted here. After having been arranged at the substrate S1, temporary baking of this seal wallplate is carried out if needed, and it is made to hold on a stage 11, using it as the semi-hardening condition that the substrate lamination mentioned later can be made smoothly.

[0096] Subsequently, although not limited to the edge of the 1st substrate S1 by it, in order to obtain a reflective mold liquid crystal display curved-surface panel here, the liquid crystal ingredient L containing the liquid crystal in which a cholesteric phase is shown is arranged.

[0097] The substrate edge which carried out alignment of the edge of the 2nd substrate S2 to the edge of a substrate S1 by carrying out the liquid crystal ingredient L in between, and was furthermore doubled in superposition and this pile is held with a holder 115. Moreover, it lets out the edge of the opposite side of a substrate S2 from Winch W, it connects with the hanging members ST, such as a string guided at guide-roller R, and a wire, and raises from the substrate S1.

[0098] The resin column RC is beforehand formed in the 2nd substrate S2 with thermoplastics (for example, polyethylene resin).

[0099] the arm 13 of after [appropriate] and a pair -- therefore, it sticks from said superposition edge side, controlling mixing of air bubbles extending the liquid crystal ingredient L among both substrates fastening both the substrates S1 and S2 between the pressurization heating rollers 12 by which spring energization was carried out with the stage 11 by carrying out radii migration (radii rocking) of the roller 12 a core [a shaft 131]. With lamination advance of a substrate, the opposite side edge of a substrate S2 is letting out Member ST one by one from Winch W, and is brought close to a substrate S1 gradually.

[0100] This lamination is performed here to the bottom of the temporary sealing doubling temperature at the heater 121 of roller 12 built-in. This temporary sealing doubling is made with the seal wallplate SL and the resin column RC.

[0101] Thus, temporary sealing doubling is carried out, it is made to hold in the electrode holder H which shows the curved-surface panel Po which had the liquid crystal ingredient enclosed to drawing 7, and this lamination processing is carried out under this predetermined lamination temperature.

[0102] The liquid crystal display curved-surface panel which has predetermined deflection in this way can be obtained.

[0103] Said electrode holder H has the substrate maintenance side Hs of the curvature according to the deflection of the liquid crystal display curved-surface panel which it is going to obtain here, lays the substrate by which temporary sealing doubling was carried out to this substrate maintenance side, and carries out this lamination processing within suitable heating furnaces, such as oven.

[0104] Thus, the liquid crystal display curved-surface panel by which cellular mixing into a liquid

crystal ingredient layer was controlled enough is obtained simply. Moreover, this liquid crystal display curved-surface panel is having carried out this lamination processing under this lamination temperature, and can maintain a predetermined curved-surface condition stably over a long period of time.

[0105] In manufacture of the liquid crystal display curved-surface panel by the manufacturing installation and it which show drawing 1 explained above, although the stage 11 is arranged in the orientation and the roller 12 was moved, a roller 12 may be arranged in an orientation and a stage 11 may be moved. Moreover, as long as a stage 11 does not have trouble even if it takes into consideration the fluidity of the liquid crystal ingredient L etc. although the substrate maintenance curved surface 113 was a concave bend side, a convex surface is sufficient as a curved surface 113.

[0106] Drawing 2, drawing 3, and drawing 4 show other examples of the manufacturing installation of a liquid crystal display curved-surface panel.

[0107] A liquid crystal ingredient layer is arranged between the 1st [which has flexibility in itself], and 2nd substrates, and this manufacturing installation can also be used for the manufacture of a liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall with which this liquid crystal ingredient layer closes this periphery section between substrates.

[0108] This manufacturing installation has stage 11' in which inhalation-of-air room 111' was formed inside. the upper wall 112 of stage 11' -- if it puts in another way, the top face of the head-lining wall 112 of inhalation-of-air room 111' is formed in the same board maintenance concave bend side 113 as the above. This concave bend side 113 is arranged towards the top.

[0109] The inhalation-of-air hole 114 for substrate suction maintenance of a large number which are open for free passage in inhalation-of-air room 111' from this substrate maintenance concave bend side 113 is formed in the head-lining wall 112.

[0110] The exhaust air pump is connected to inhalation-of-air room 111' through the valve which omitted illustration.

[0111] Moreover, the substrate holder 115 is formed in the edge of the substrate maintenance concave bend side 113 at the head-lining wall 112.

[0112] Furthermore, free passage formation of the concave G2 which opening faces the concave G1 of the pair which opening faces both the handle parts of the substrates S1 and S2 held here, and the lamination trailer of substrates S1 and S2 is carried out mutually in the substrate maintenance concave bend side 113 of the head-lining wall 112.

[0113] Stage 11' is supported by the arm 116 and this arm 116 is supported rockable with the shaft 117 by the column 110 which recovers from Pedestal BS. The core of a shaft 117 is in agreement with the core C1 of the radius of curvature of the substrate maintenance concave bend side 113 of stage 11'. Therefore, stage 11' is movable with the drive of an illustration abbreviation in accordance with the radii orbit centering on the radius-of-curvature core C1 of the substrate maintenance curved surface 113.

[0114] From the upper part, the pressurization member 12 countered the substrate maintenance concave bend side 113, and it is faced.

[0115] The pressurization member 12 is arranged in the lowest orientation on the circle which passes along this pressurization member centering on the radius-of-curvature core C1 of the substrate maintenance concave bend side 113 of movable stage 11'.

[0116] The pressurization member 12 is the pressurization heating roller which contained the heater 121 like the above.

[0117] The roller 12 is supported by the column 130 which recovers from Pedestal BS here, and member 130b which hangs from level arm 130a by which the cantilevered suspension was carried out to this column. The roller 12 is supported by this column 130 and suspension member 130b possible [rise and fall] a little and free [rotation] on them. The spring 14 is attached in each of a column 130 and suspension member 130b, and this spring always turned the roller 12 to the substrate maintenance concave bend side 113, and is energizing it.

[0118] In addition, as shown in drawing 4, the width of face w1 of the pressurization heating roller 12 is larger than the width of face w2 of the substrates S1 and S2 held on the substrate maintenance curved surface 113 a little. Similarly it is set up. it is set up so that it may begin to see a little on both sides from

this substrate width of face, and the distance between pin center, larges of the concave G1 of said pair is the same as said substrate width of face w2 -- or abbreviation -- The distance w3 between common-law marriages of the concave G1 of this pair is set up smaller than said substrate width of face w2, and the distance w4 between rims of the concave G1 of this pair is set up more greatly than said substrate width of face w2.

[0119] The manufacture of the liquid crystal display curved-surface panel using this equipment is as follows.

[0120] First, alignment of the 1st same substrate S1 as the above mentioned thing is carried out to the predetermined location of the substrate maintenance concave bend side 113, and it is made to hold in it. This substrate maintenance is performed by opening the valve of an illustration abbreviation and operating an exhaust air pump.

[0121] Subsequently, the liquid crystal ingredient L is arranged at the edge of the 1st substrate S1.

[0122] The substrate edge which carried out the liquid crystal ingredient L in between, and doubled with the edge of a substrate S1 the edge of the 2nd same substrate S2 as what was furthermore described above in superposition and this pile is held with a holder 115.

[0123] Moreover, the edge of the opposite side of a substrate S2 is hung, and it connects with Member ST, and raises from the substrate S1.

[0124] It sticks from said superposition edge side the appropriate back, controlling mixing of air bubbles extending the liquid crystal ingredient L among both substrates fastening both the substrates S1 and S2 between the pressurization heating rollers 12 by which spring energization was carried out with stage 11' by following the stage support arm 116 and carrying out radii migration (radii rocking) of stage 11' a core [a shaft 117]. The opposite side edge of a substrate S2 is gradually brought close to a substrate S1 with lamination advance of a substrate.

[0125] When sticking both the substrates S1 and S2, extending the liquid crystal ingredient L in this substrate lamination, substrate both the handle parts SX corresponding to the roller 12 which is in a low location most, and a pan are made to leak intensively the liquid crystal ingredient L leaked out of the seal wallplate SL from the substrate lamination trailer SY, and it can collect to concaves G1 and G2 easily.

[0126] Substrate lamination is performed here to the bottom of the temporary sealing doubling temperature at the heater 121 of roller 12 built-in. This temporary sealing doubling is made with the seal wallplate SL and the resin column RC.

[0127] Thus, temporary sealing doubling is carried out, the curved-surface panel Po which had the liquid crystal ingredient enclosed is made to hold in an electrode holder H like the above, and this lamination processing is carried out under this predetermined lamination temperature.

[0128] The liquid crystal display curved-surface panel which has predetermined deflection in this way can be obtained.

[0129] The container 118 shown in drawing 5 and drawing 6 as a recovery means of the liquid crystal ingredient L is also employable.

[0130] That is, [near the roller 12 arranged in the lowest orientation], under both the handle parts SX of both the substrates S1 and S2 stuck, opening may be made to face this handle part and the container 118 for liquid crystal ingredient recycling may be arranged. The liquid crystal ingredient which flows out of substrate both the handle parts SX in the middle of substrate lamination intensively by the roller 12 being arranged in the lowest orientation is recoverable in this container 118. Furthermore, when form in the substrate maintenance concave bend side 113 concave G3 which opening faces the lamination trailer SY of both the substrates S1 and S2, and this concave G3 is made to incline toward the both-sides edge of a curved surface 113 and the lamination trailer SY arrives at a container 118 by this, you may make it collect liquid crystal ingredients from this slot G3 to a container 118.

[0131] In addition, the roller 12 in the manufacturing installation explained above can also be transposed to the so-called sector roller which has the substrate pressurization curved surface which presents a radii profile seen from a side face.

[0132] Drawing 8 shows the example of further others of a liquid crystal display curved-surface panel

manufacturing installation.

[0133] A liquid crystal ingredient layer is arranged between the 1st [which has flexibility in itself], and 2nd substrates, and the equipment shown in drawing 8 can also be used for the manufacture of a liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall with which this liquid crystal ingredient layer closes this periphery section between substrates.

[0134] The manufacturing installation of this liquid crystal display curved-surface panel has the stage 21 of the roller gestalt in which the inhalation-of-air room 211 was formed inside. A part of peripheral face of the peripheral wall 212 of a stage 21 is made into the board maintenance curved surface (here substrate maintenance convex surface) 213. The substrate maintenance convex surface 213 is a substrate maintenance convex surface of the curvature according to the deflection of the liquid crystal display curved-surface panel which it is going to obtain here. This stage roller 21 is arranged in the orientation, and is pivotable to the circumference of the clockwise rotation in drawing at the driving gear of an illustration abbreviation.

[0135] The inhalation-of-air hole 214 for substrate suction maintenance of a large number which are open for free passage in the inhalation-of-air room 211 from the substrate maintenance convex surface 213 is formed in the peripheral wall 212 of a stage 21.

[0136] The exhaust air pump P is connected to the inhalation-of-air room 211 through Valve V.

[0137] From the lower part, the pressurization member 22 countered the stage 21 and it is attended.

[0138] The pressurization member 22 is a thing of a roller gestalt which has the board support convex surface (here substrate support convex surface) 221 of larger curvature than the curvature of the substrate maintenance convex surface 213 as a peripheral surface.

[0139] That is, a surface is the roller formed by India rubber, and the pressurization member 22 builds the heater 222 for heating in the interior here. The pressurization member 22 is a pressurization heating roller here.

[0140] The roller 22 is supported by the roller supporter material of an illustration abbreviation possible [rise and fall] a little and pivotable, and is always energized towards the stage 21 by the elastic member of an illustration abbreviation. Moreover, synchronizing with rotation of a stage 22, the rotation drive of the roller 22 is carried out with the driving gear of an illustration abbreviation at the counterclockwise rotation in drawing. In addition, rotation of a stage 21 may be made to carry out follower rotation of the roller 22.

[0141] The orientation member 23 which supports a substrate is also installed in the upstream of a roller 22.

[0142] The manufacture of the liquid crystal display curved-surface panel using this equipment is as follows.

[0143] First, alignment of the 1st same substrate S1 as the above is carried out to the predetermined location of the substrate maintenance convex surface 213 of a stage 21, and it is made to hold in it. This substrate maintenance is performed by attracting a substrate by opening Valve V and operating the exhaust air pump P.

[0144] Next, supporting the 2nd same substrate S2 as the above-mentioned with the orientation member 23 and a roller 22, alignment of the edge of this substrate S2 is carried out to the edge of the substrate S1 held on the stage 21, and it is laid on top of it. Moreover, the liquid crystal ingredient L is arranged to the field between substrates which carries out arranging the liquid crystal ingredient L at the edge of a substrate S2 in advance of the superposition etc., and includes between superposition edges.

[0145] By rotating a roller 22, while rotating a stage 21, fastening both the substrates S1 and S2 that predetermined edges piled up in this way between a stage 21 and a roller 22 While sticking both the substrates S1 and S2 from said superposition edge side, extending the liquid crystal ingredient L between both the substrates S1 and S2, the part SZ on which both the substrates S1 and S2 of each other were stuck is made to hold as it is to the substrate maintenance convex surface 213 of a stage 21.

[0146] This substrate lamination is performed here to the bottom of the temporary sealing doubling temperature at the heater 221 of roller 22 built-in.

[0147] Thus, temporary sealing doubling is carried out, it is made to hold in an electrode holder like the

electrode holder H which shows the curved-surface panel which had the liquid crystal ingredient enclosed to drawing 7 , and this lamination processing is carried out under this predetermined lamination temperature.

[0148] The liquid crystal display curved-surface panel which has predetermined deflection in this way can be obtained.

[0149] In manufacture of the liquid crystal display curved-surface panel shown in drawing 8 , since it is not necessary to hang both the substrates part still stuck and to make it dissociate by Member ST etc., a liquid crystal display curved-surface panel can be obtained so easily.

[0150] Thus, the liquid crystal display curved-surface panel by which cellular mixing into a liquid crystal ingredient layer was controlled enough is obtained simply. Moreover, this liquid crystal display curved-surface panel is carrying out this lamination processing under this lamination temperature, and can maintain a predetermined curved-surface condition stably over a long period of time.

[0151] In manufacture of the liquid crystal display curved-surface panel by the manufacturing installation and it which show drawing 8 explained above, although the 2nd substrate S2 was supported by the pressurization member 22 of a roller gestalt, this pressurization member may be a pressurization member which has a flat substrate back face, and should just move this pressurization member along this substrate support flat surface in that case.

[0152] Moreover, even if there is little substrate S1, you may make it make an edge hold on a stage 21, although the 1st substrate S1 made the whole hold on a stage 21. Drawing 9 shows the example of a manufacturing installation which is used in such a case.

[0153] With the equipment shown in drawing 9 , stage 21' of a roller gestalt which formed the substrate holder 215 and which does not have an inhalation-of-air room is used for the peripheral face as a stage holding the 1st substrate S1. Other points have attached the same reference mark as drawing 8 about the thing are the same as that of the equipment shown in drawing 8 , and same as the components in the equipment shown in drawing 8 , and a part.

[0154] In the case of this equipment, this both substrates edge is held to stage 21' with a holder 215 in the condition of having carried out alignment of the edge of substrates S1 and S2, and having arranged the liquid crystal ingredient L between superposition and a substrate, and lamination of a substrate is performed. The free edge of a substrate S1 is raised by the suitable hanging member ST, and is brought close to a substrate S2 with substrate lamination advance. The stuck substrate is twisted around stage 21'.

[0155] Two or more adhesion laminating of the liquid crystal display curved-surface panel obtained by the equipment explained above can be carried out, and the liquid crystal display curved-surface panel of a laminating mold can also be obtained easily.

[0156] For example, the adhesion laminating of the curved-surface panel for a red display, the curved-surface panel for a green display, and the curved-surface panel for a blue display can be carried out in this sequence, and the liquid crystal display curved-surface panel in which full color image display is possible can be obtained.

[0157] Drawing 10 shows the example of further others of the manufacturing installation of a liquid crystal display curved-surface panel.

[0158] This manufacturing installation can be used for carrying out the laminating of two or more liquid crystal display panels which have flexibility in itself, and obtaining a laminating mold liquid crystal display curved-surface panel.

[0159] This manufacturing installation has the stage 31 in which the inhalation-of-air room 311 was formed inside.

[0160] the upper wall 312 of a stage 31 -- if it puts in another way, the top face of the head-lining wall 312 of the inhalation-of-air room 311 is formed in the board maintenance convex surface 313. The board maintenance convex surface 313 is a panel maintenance convex surface of the curvature according to the deflection of the laminating mold liquid crystal display curved-surface panel which it is going to obtain here. This convex surface 313 is arranged in the orientation towards the top.

[0161] The inhalation-of-air hole 314 for panel suction maintenance of a large number which are open

for free passage in the inhalation-of-air room 311 from this panel maintenance convex surface 313 is formed in the head-lining wall 312.

[0162] The exhaust air pump P is connected to the inhalation-of-air room 311 through Valve V.

[0163] From the upper part, the pressurization member 32 countered the panel maintenance convex surface 313, and it is faced.

[0164] The pressurization member 32 is the roller with which the surface was formed by India rubber here.

[0165] The roller 32 is supported by drawing 10 between the upper limit sections of the support arm 33 of the pair by which only one side is illustrated. The roller 32 is supported possible [rise and fall] a little and free [rotation] on this arm by the arm 33 of this pair. The spring 34 is attached in the upper limit section of each arm 33, and this spring always turned the roller 32 to the panel maintenance convex surface 313, and is energizing it.

[0166] Radii migration (radii rocking) of the arm 33 of a pair can be carried out with the drive which omitted illustration centering on the shaft 331. The core of a shaft 331 is made in agreement focusing on [C2] the radius of curvature of the panel maintenance convex surface 313. Therefore, a roller 32 is movable in accordance with the radii orbit centering on the radius-of-curvature core of the panel maintenance curved surface 313.

[0167] The manufacture of the laminating mold liquid crystal display curved-surface panel using this equipment is as follows.

[0168] First, alignment of the 1st liquid crystal display panel P1 is carried out to the predetermined location of the panel maintenance convex surface 313, and it is made to hold in it. This panel maintenance is performed by attracting a panel P1 by opening Valve V and operating the exhaust air pump P.

[0169] A panel P1 is a liquid crystal display panel of a reflective mold here. ***** BK is beforehand formed in the external surface.

[0170] On the top face of this panel P1, as adhesives, although not limited to it, pressure sensitive adhesive sheet N is stuck here, and that protection sheet is removed.

[0171] Subsequently, the edge of the 2nd reflective mold liquid crystal display curved-surface panel P2 is laid on top of the edge of a panel P1. In addition, at this time, the edge of the opposite side of a panel P2 is raised by the suitable hanging member ST, and is brought close to a panel P1 with panel lamination advance.

[0172] And it sticks with Binder N, deaerating from between both panels fastening both the panels P1 and P2 between the pressurization rollers 32 by which spring energization was carried out with the stage 31 by following the arm 33 of a pair and carrying out radii migration (radii rocking) of the pressurization roller 32 a core [a shaft 331].

[0173] The liquid crystal display curved-surface panel of the laminating mold which has predetermined deflection in this way can be obtained easily.

[0174] Furthermore, stress relief heat treatment is performed to this laminating mold panel at predetermined temperature.

[0175] Thus, the liquid crystal display curved-surface panel of the laminating mold by which degassing was enough carried out from between panels is obtained simply. Moreover, this laminating mold liquid crystal display curved-surface panel is having performed stress relief heat treatment, and can maintain a predetermined curved-surface condition stably over a long period of time.

[0176] When there is a liquid crystal display panel which should be carried out a laminating further It is considered that the liquid crystal display panel which should be stuck on a degree while considering that the stuck liquid crystal display panel which is obtained according to said panel lamination process is said 1st liquid crystal display panel P1 about the liquid crystal display panel of the 3rd henceforth is said 2nd liquid crystal display panel P2. By repeating said each process, it sticks the following liquid crystal display panel at a time on one already stuck liquid crystal display panel, and the laminating mold liquid crystal display curved-surface panel by which the laminating of the panel of the number of predetermined leaves was carried out can be obtained.

[0177] For example, the adhesion laminating of the curved-surface panel for a red display, the curved-surface panel for a green display, and the curved-surface panel for a blue display can be carried out in this sequence, and the liquid crystal display curved-surface panel in which full color image display is possible can be obtained.

[0178] In manufacture of the laminating mold liquid crystal display curved-surface panel by the manufacturing installation and it which show drawing 10 explained above, although the stage 31 is arranged in the orientation and the pressurization roller 32 was moved, a roller 32 may be arranged in an orientation and a stage 31 may be moved. Moreover, although the panel maintenance curved surface 313 was a convex surface, a concave bend side is sufficient as a stage 31.

[0179] Drawing 11 and drawing 12 show the example of further others of the manufacturing installation of a liquid crystal display curved-surface panel.

[0180] This manufacturing installation can be used for carrying out the laminating of two or more liquid crystal display panels which have flexibility in itself, and obtaining a laminating mold liquid crystal display curved-surface panel.

[0181] This equipment has the stage 41 in which the inhalation-of-air room 411 was formed inside. the upper wall 412 of a stage 41 -- if it puts in another way, the top face of the head-lining wall 412 of the inhalation-of-air room 411 is formed in the board maintenance concave bend side 413. The board maintenance concave bend side 413 is a panel maintenance concave bend side of the curvature according to the deflection of the laminating mold liquid crystal display curved-surface panel which it is going to obtain here. This concave bend side 413 is arranged towards the top.

[0182] The inhalation-of-air hole 414 for substrate suction maintenance of a large number which are open for free passage in the inhalation-of-air room 411 from this panel maintenance concave bend side 413 is formed in the head-lining wall 412.

[0183] The exhaust air pump P is connected to the inhalation-of-air room 411 through Valve V.

[0184] The stage 41 is supported by the support arm 43 (one side is an illustration abbreviation) of a pair. Radii migration (radii rocking) of the support arm 43 of this pair can be carried out with the drive which omitted illustration centering on the shaft 431. The core of a shaft 431 is made in agreement focusing on [C3] the radius of curvature of the panel maintenance concave bend side 413. Therefore, a stage 41 is movable in accordance with the radii orbit centering on the radius-of-curvature core of the panel maintenance concave bend side 413.

[0185] From the upper part, the pressurization member 42 countered this panel maintenance concave bend side 413, and it is faced.

[0186] The pressurization member 42 is the pressurization roller of the roller gestalt which has the board maintenance convex surface 421 of larger curvature than the curvature of the panel maintenance concave bend side 413 as a peripheral surface. The board maintenance convex surface 421 is a panel maintenance convex surface which holds a liquid crystal display panel here.

[0187] Synchronizing with rotation of a stage 41, the rotation drive of the pressurization roller 42 is carried out with the driving gear of an illustration abbreviation at the clockwise rotation in drawing.

[0188] The pressurization roller 42 is a hollow roller and the inhalation-of-air hole 423 for panel suction which is open for free passage from a centrum 422 to the panel maintenance convex surface (peripheral face) 421 is formed. Moreover, the diaphragm 425 for forming the inhalation-of-air room 424 in a centrum 422 to the panel maintenance convex surface part located in the upstream from the closest-approach part of this pressurization roller 42 and a stage 41 in the migration direction of a peripheral surface 421 is built in, and the inhalation-of-air room 424 is connected to exhaust air pump P' through valve V'.

[0189] The manufacture of the liquid crystal display curved-surface panel using this equipment is as follows.

[0190] First, alignment of the 1st liquid crystal display panel P1 is carried out to the predetermined location of the panel maintenance concave bend side 413 of a stage 41, and it is made to hold in it. This panel maintenance is performed by attracting a panel P1 by opening Valve V and operating the exhaust air pump P.

[0191] A panel P1 is a liquid crystal display panel of a reflective mold. ***** BK is beforehand formed in the external surface.

[0192] Pressure sensitive adhesive sheet N is stuck on the top face of this panel P1 as adhesives, and that protection sheet is removed.

[0193] On the other hand, alignment of the liquid crystal display panel P2 of the 2nd reflective mold is carried out to the panel maintenance convex surface (peripheral surface) 421 of the pressurization roller 42, and it is made to hold to it. This panel maintenance opens the inhalation-of-air room 424 in a pressurization roller for valve V', operates exhaust air pump P', and is performed by exhausting.

[0194] Subsequently, suitable include-angle rotation of a stage 41 and the pressurization roller 42 is carried out, and the edge of a panel P2 is laid on top of the edge of a panel P1.

[0195] It sticks with Binder N the appropriate back, deaerating from between both panels by carrying out synchronous rotation of a stage 41 and the pressurization roller 42 further fastening both the panels P1 and P2 between a stage 41 and the pressurization roller 42.

[0196] At this time, by carrying out sequential shift to an atmospheric-air field from the field which the inhalation-of-air hole 423 faces the inhalation-of-air room 424, the panel P2 on the pressurization roller 42 is released from the sequential pressurization roller 42 from the part stuck on the panel P1, and can obtain easily the liquid crystal display curved-surface panel of the laminating mold which has predetermined deflection in this way on a stage 41.

[0197] Furthermore, stress relief heat treatment is performed to this laminating mold panel at predetermined temperature.

[0198] Thus, the liquid crystal display curved-surface panel of the laminating mold by which degassing was enough carried out from between panels is obtained simply. Moreover, this laminating mold liquid crystal display curved-surface panel is having performed stress relief heat treatment, and can maintain a predetermined curved-surface condition stably over a long period of time.

[0199] When there is a liquid crystal display panel which should be carried out a laminating further It is considered that the liquid crystal display panel which should be stuck on a degree while considering that the stuck liquid crystal display panel which is obtained according to said panel lamination process is said 1st liquid crystal display panel P1 about the liquid crystal display panel of the 3rd henceforth is said 2nd liquid crystal display panel P2. By repeating said each process, it sticks the following liquid crystal display panel at a time on one already stuck liquid crystal display panel, and the laminating mold liquid crystal display curved-surface panel by which the laminating of the panel of the number of predetermined leaves was carried out can be obtained.

[0200] For example, the adhesion laminating of the curved-surface panel for a red display, the curved-surface panel for a green display, and the curved-surface panel for a blue display can be carried out in this sequence, and the liquid crystal display curved-surface panel in which full color image display is possible can be obtained.

[0201] Drawing 13 shows the modification of the equipment of drawing 11. The equipment shown in drawing 13 is replaced with the **** pressurization roller 42, and adopts pressurization roller 42' as the equipment shown in drawing 11. If this point is removed, it is the same as that of the equipment shown in drawing 11. The same reference mark is given to the same part as the equipment shown in drawing 11, and components.

[0202] Pressurization roller 42' does not have the diaphragm which forms an inhalation-of-air room and it, but has the temporary maintenance adhesives 420 in the change at the peripheral surface.

[0203] The 2nd panel P2 is made to hold to pressurization roller 42' with these temporary maintenance adhesives 420.

[0204] The temporary maintenance adhesives 420 have adhesive strength weaker than the binder N on which both the liquid crystal display panels P1 and P2 are pasted up. therefore, pressurization roller 42' in a panel lamination process -- the upper panel P2 is released from sequential pressurization roller 42' from the part stuck on the panel P1.

[0205] A liquid-crystal ingredient layer is arranged between the 1st [which has flexibility in itself], and 2nd substrates, and the equipment of the type shown in the equipment and drawing 13 of the type shown

in the equipment, drawing 11 , and drawing 12 of the type shown in drawing 10 explained above can use also for the manufacture of a liquid crystal display curved-surface panel by which surrounding enclosure is carried out with the seal wall with which this liquid-crystal ingredient layer closes this periphery section between substrates.

[0206] Moreover, the equipment of the type shown in the equipment of the type shown in drawing 1 , the type equipment shown in drawing 2 , the equipment of the type shown in drawing 8 , and drawing 9 can be used, also when carrying out the laminating of the liquid crystal display panel which has flexibility in itself and manufacturing a laminating mold liquid crystal display curved-surface panel.

[0207] Drawing 14 shows the example of further others of a liquid crystal display curved-surface panel manufacturing installation.

[0208] The equipment shown in drawing 14 can be used for manufacturing a liquid crystal display curved-surface panel from the liquid crystal display panel which has flexibility in itself using the panel maintenance shell of the deflection which imitated the deflection of the liquid crystal display curved-surface panel which it is going to obtain.

[0209] The roller 42 of the same structure operation as the pressurization roller 42 adopted with the equipment shown by drawing 11 and drawing 12 as a stage for holding the liquid crystal display panel P3 which should be formed in a curved-surface panel is used for this equipment. The pressurization member 50 has countered this roller 42. The pressurization member 50 is a pressurization roller here.

[0210] And although not limited to it, the resin shell PA of the transparence which serves as covering which protects the image observation side of a liquid crystal display panel as said panel maintenance shell is adopted here. The curvature of the panel maintenance convex surface (peripheral surface) of a roller 42 is larger than the curvature of this shell PA. If it puts in another way, the shell PA where curvature is smaller than a roller 42 will be adopted.

[0211] The manufacture of the liquid crystal display curved-surface panel by this equipment is as follows.

[0212] First, the resin shell PA of said transparence is prepared and Binder N is formed in this.

[0213] Moreover, a roller 42 is made to carry out suction maintenance of the liquid crystal display panel P3 which has flexibility in itself which should be stuck on Shell PA.

[0214] Subsequently, the predetermined edge of the panel maintenance shell PA is laid on top of the predetermined edge of the liquid crystal display panel P3 held on the roller 42, supporting the panel maintenance shell PA with the pressurization roller 50, as shown in drawing 4 (A).

[0215] Thus, while rotating this stage roller 50, fastening the panel maintenance shell PA and the liquid crystal display panel P3 which predetermined edges piled up between the stage roller 42 and the pressurization roller 50 as shown in drawing 4 (B), the pressurization roller 50 also sticks the panel maintenance shell PA and the liquid crystal display panel P3 with Adhesives N from said superposition edge side by carrying out synchronous rotation.

[0216] The liquid crystal display curved-surface panel P3 held in this way in the panel maintenance shell PA can be obtained easily.

[0217] It replaces with the stage roller 42, and as shown in drawing 15 , even if it uses roller 42' which has the temporary maintenance adhesives 420 adopted with the equipment shown in drawing 13 , the liquid crystal display curved-surface panel P3 held similarly in the panel maintenance shell PA can be obtained easily.

[0218] The liquid crystal display panel which should be carried out a laminating two or more at a certain time in addition, about the liquid crystal display panel of the 2nd henceforth By considering that the liquid crystal display curved-surface panel held in the panel maintenance shell obtained according to said lamination process is said panel maintenance shell, and repeating said each process It sticks the following liquid crystal display panel at a time on one liquid crystal display curved-surface panel held in the panel maintenance shell, and the liquid crystal display curved-surface panel of the laminating mold which carried out the laminating of the panel of the number of predetermined leaves can also be obtained.

[0219] For example, the adhesion laminating of the curved-surface panel for a red display, the curved-

surface panel for a green display, and the curved-surface panel for a blue display can be carried out in this sequence, and the liquid crystal display curved-surface panel in which full color image display is possible can be obtained.

[0220] Anyway, about the liquid crystal display curved-surface panel made to hold to a panel maintenance shell, stress relief heat treatment may be performed at predetermined temperature. By doing so, a predetermined curved-surface condition is stably maintainable over a long period of time.

[0221] In addition, the equipment of the type shown in each of drawing 1, drawing 2, drawing 8, drawing 10, drawing 11, and drawing 13 can be used, also when making the liquid crystal display panel which has flexibility in itself hold to a panel maintenance shell and forming a liquid crystal display curved-surface panel in it.

[0222] As mentioned above, although explained taking the case of the case where the liquid crystal display curved-surface panel of a reflective mold is mainly obtained, the curved-surface panel for manufacture does not need to be limited to the liquid crystal display curved-surface panel of a reflective mold.

[0223]

[Effect of the Invention] As explained above, according to this invention, the manufacture approach of a liquid crystal display curved-surface panel that a liquid crystal display curved-surface panel can be obtained easily can be offered.

[0224] Moreover, the manufacture approach of a liquid crystal display curved-surface panel that a liquid crystal display curved-surface panel can be obtained can be offered, controlling mixing of the air bubbles to a liquid crystal ingredient layer.

[0225] Moreover, the manufacture approach of a liquid crystal display curved-surface panel that a liquid crystal display curved-surface panel can be obtained can be offered, controlling the futility of a liquid crystal ingredient.

[0226] Moreover, the manufacture approach of a liquid crystal display curved-surface panel that the liquid crystal display curved-surface panel which can maintain a predetermined curved-surface condition stably over a long period of time can be obtained can be offered.

[0227] Moreover, according to this invention, the manufacture approach of the liquid crystal display curved-surface panel of a laminating mold that the liquid crystal display curved-surface panel of a laminating mold can be easily obtained from the liquid crystal display panel of two or more monolayers can be offered.

[0228] Moreover, the manufacture approach of the liquid crystal display curved-surface panel of a laminating mold that a predetermined curved-surface condition is stably maintainable over a long period of time can be offered.

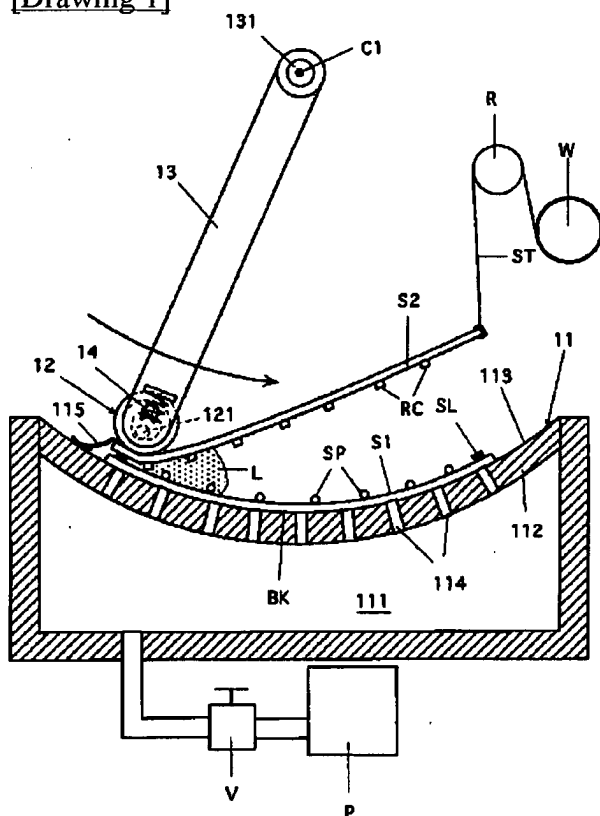
[0229] Moreover, according to this invention, the manufacturing installation which can manufacture a liquid crystal display curved-surface panel easily can be offered.

[Translation done.]

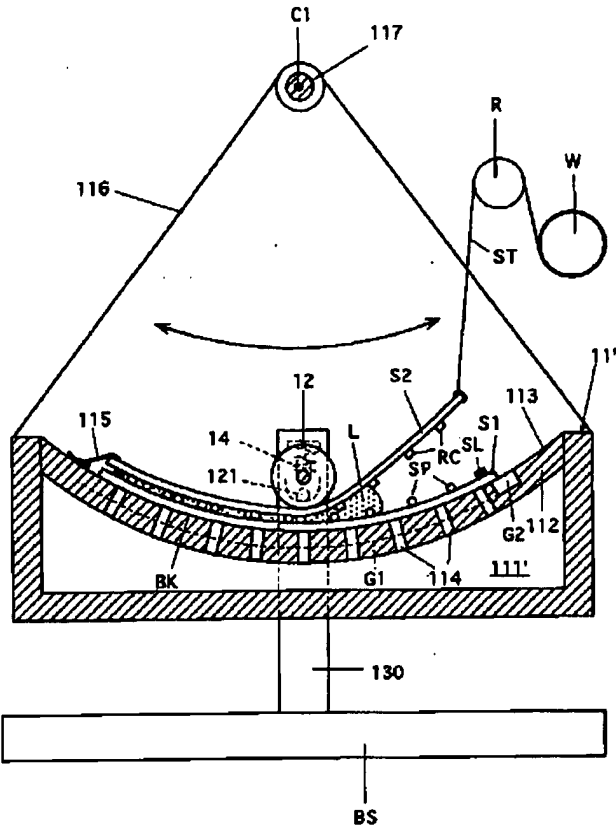
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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

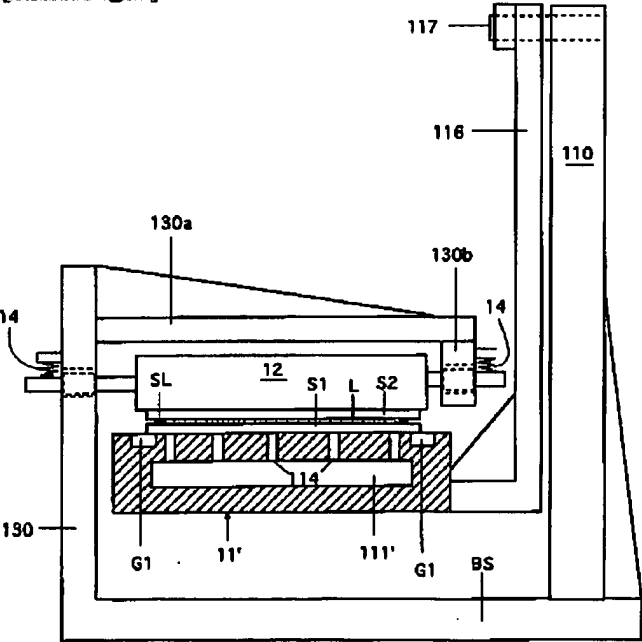
[Drawing 1]



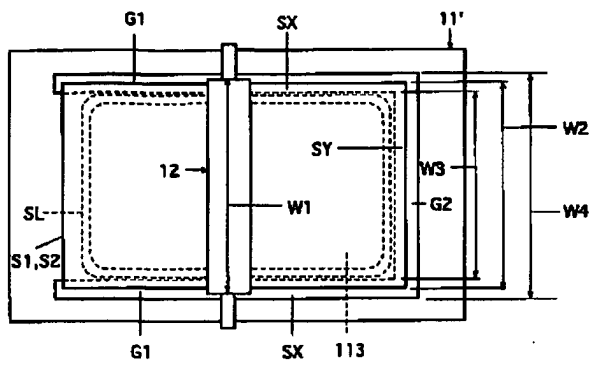
[Drawing 2]



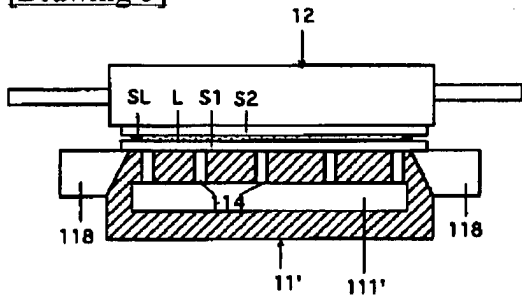
[Drawing 3]



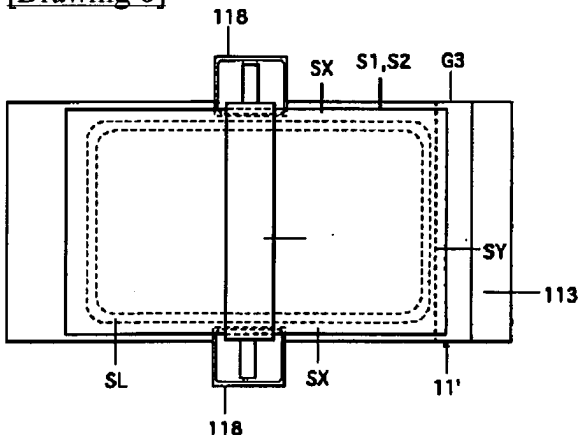
[Drawing 4]



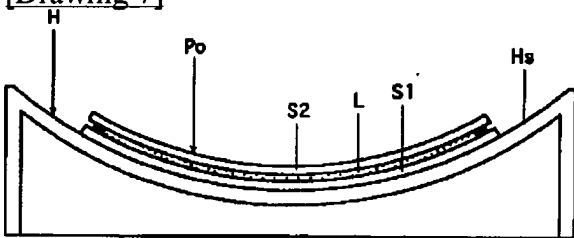
[Drawing 5]



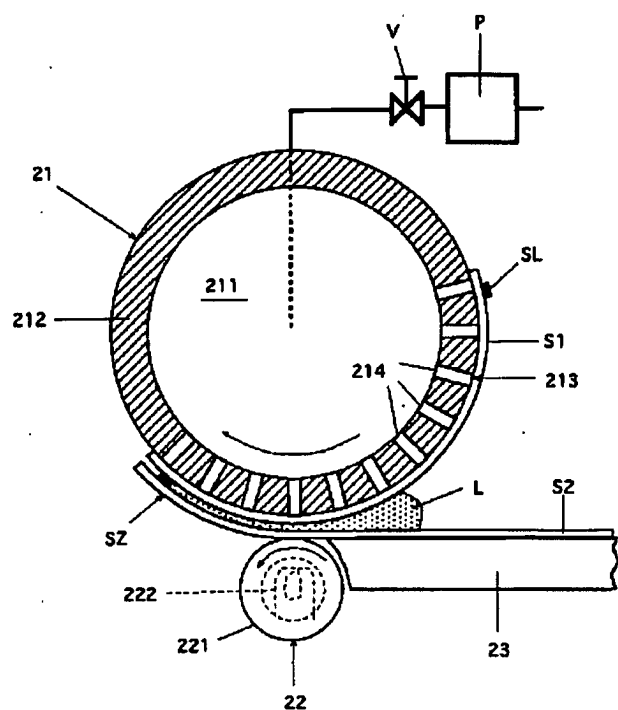
[Drawing 6]



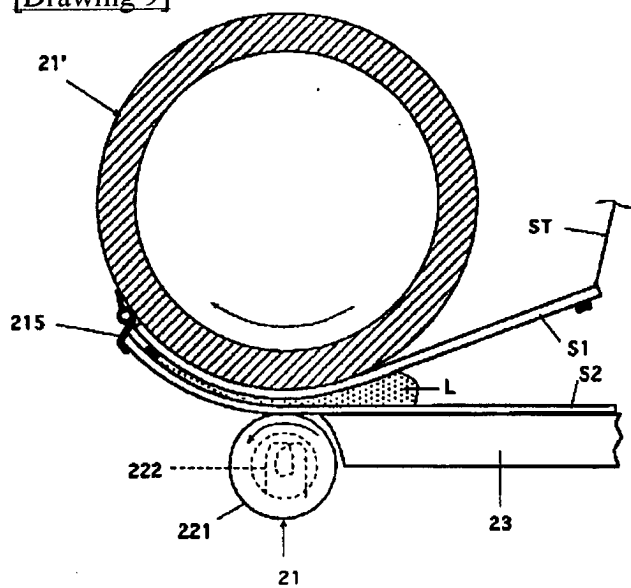
[Drawing 7]



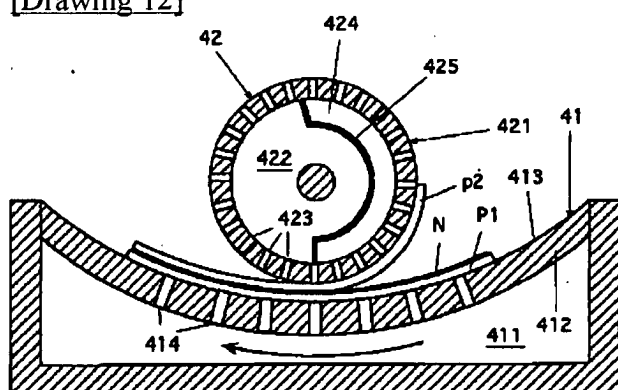
[Drawing 8]



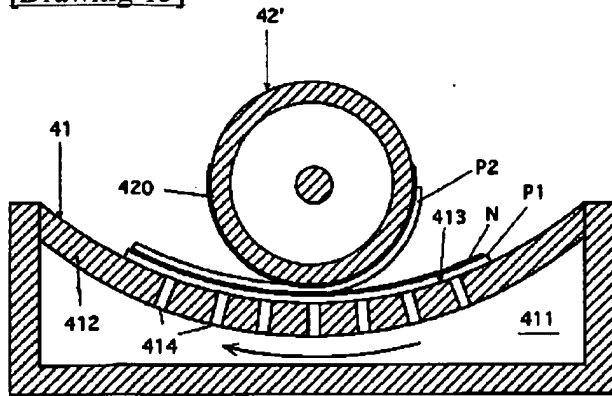
[Drawing 9]



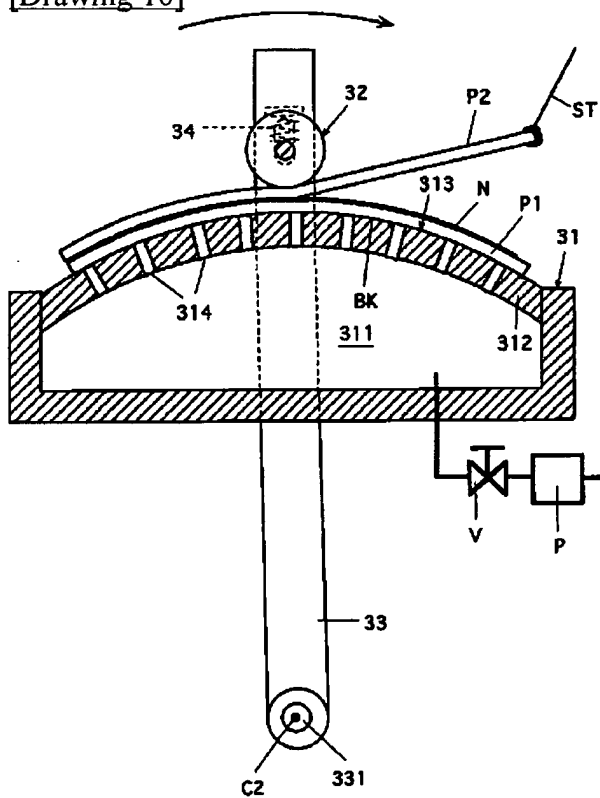
[Drawing 12]



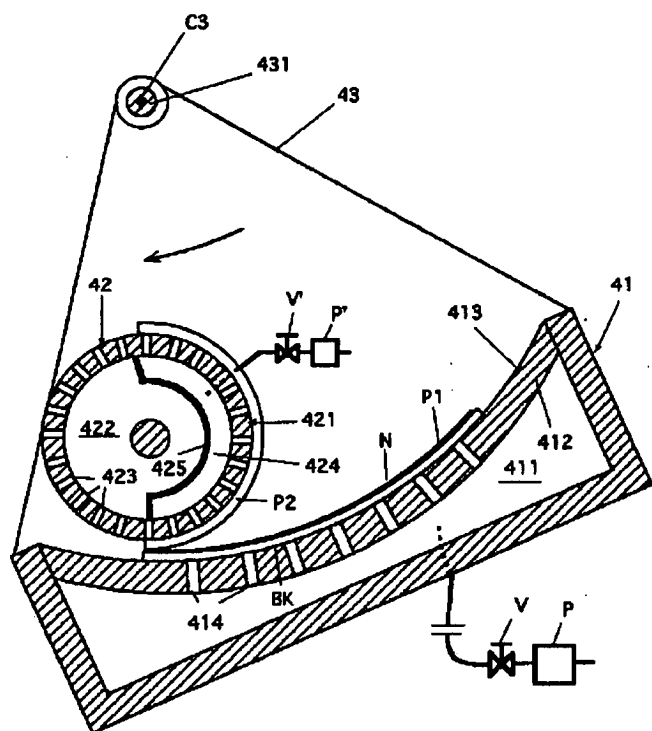
[Drawing 13]



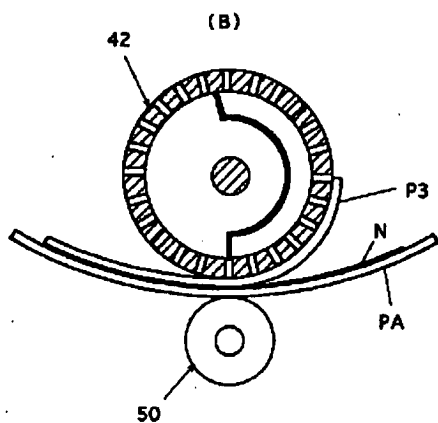
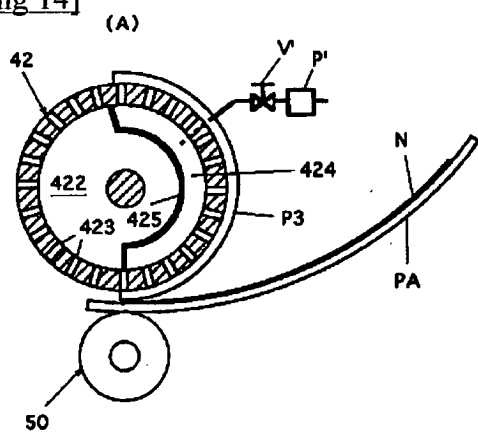
[Drawing 10]



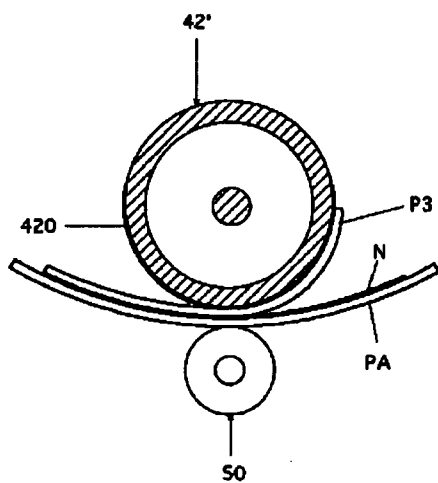
[Drawing 11]



[Drawing 14]



[Drawing 15]



[Translation done.]